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DEPARTMENT OF TRANSPORTATION

FEDERAL AVIATION ADMINISTRATION

SPECIFICATION

NOISE CANCELING HEADSET AND HANDSET

1. SCOPE

1.1 Scope.- The equipments specified herein are two types of lightweight headset assemblies and a handset assembly designed for use as an FAA standard and used with communication systems at air traffic control facilities. The assemblies consist of a transmit unit, an amplifier, receiver unit, a push-to-talk switch, and a connecting retractile cord with twin jack plug. The transmit unit is designed to suppress undesired background noises and voices.

1.2 Classification.- The noise canceling headsets and handset are as follows:

Type 1 - Ear muff with headband assembly, headset

Type 2 - Over-the-ear, ear assembly, headset

"G" style - Telephone type, handset

The illustrations for these items are shown in figures 4, 5, and 6.

2. APPLICABLE DOCUMENTS

2.1 FAA documents.- The following FAA documents, of the issues specified in invitation for bids or request for proposals, form a part of this specification to the extent as specified herein.

2.1.1 FAA specifications:

FAA-G-2100/1	Electronic Equipment, General Requirements; Part 1, General Requirements for All Equipments
FAA-G-2100/3	Part 3, Requirements for Equipments Employing Semiconductor Devices
FAA-G-2100/4	Part 4, Requirements for Equipment Employing Printed Wiring Techniques
FAA-G-2100/5	Part 5, Requirements for Equipments Employing Microelectronic Devices

2.1.2 FAA standards:

FAA-STD-013	Quality Control Program Requirements
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(Copies of this specification and other applicable FAA specifications, standards and drawings may be obtained from the Contracting Officer in the Federal Aviation Administration Office issuing the invitation for bids or request for proposals. Requests should fully identify material desired, i.e., specifications, standard, amendment, and drawing numbers and dates. Requests should cite the invitation for bids, request for proposals, or the contract involved or other use to be made of the requested material.)

2.2 Military and federal publications.- The following military and federal publications, of the issues in effect on date of the time of invitation for bid or request for proposal form a part of this specification and are applicable to the extent specified herein.

2.2.1 Military specifications.

MIL-M-26542A	(USAF) - Microphone, dynamic M-87/AIC
MIL-HDBK-217A	Reliability and Failure Rate Data for Electronic Equipment
MIL-E-17555	Electronic and Electrical Equipment and Associated Repair Parts, Preparation for Delivery of

2.2.2 Federal standard.

FED-STD-595	Colors
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3. REQUIREMENTS

3.1 Equipment to be furnished by contractor.- Each type of equipment furnished by the contractor shall be complete in accordance with all specification requirements. User instructions shall be supplied with each headset and handset. Diagrams, maintenance instructions and a parts list shall be furnished in accordance with the contract schedule.

3.1.1 Applicability of FAA-G-2100/1b.- The following paragraphs of FAA-G-2100/1b shall apply with the limitations as shown:

- 1-3.2.2
- 1-3.2.4 to 1-3.2.5
- 1-3.2.11
- 1-3.2.12 (Modified definition: Part: A manufactured elemental product comprised of one or more pieces and not designed for field disassembly, such as amplifier circuit boards, transducer capsule assembly, etc.)
- 1-3.2.13
- 1-3.2.18 to 1-3.2.20
- 1-3.2.21 Modified table:

<u>Parameter</u>	<u>Standard Design- Center Value</u>
Ambient temperature	+30 C
DC current	75 ma

1-3.2.22 Modified table:

<u>Parameter</u>	<u>Tolerance</u>
Temperature	+10°C
DC Current	±25 ma

- 1-3.5.9.2.2
- 1-3.8.4 to 1-3.8.5.2
- 1-3.8.5.3 Modify as follows: Either bright chromium or bright nickel on electroplated exterior hardware for flexible members (e.g., headband and microphone element assembly) shall be used.

- 1-3.8.5.4 and 1-3.8.5.5
- 1-3.8.6 to 1-3.8.8
- 1-4.1 to 1-4.2

1.4.3 (Modified paragraph: delete FCC Type Acceptance Procedures)

- 1-4.3.1.1
- 1-4.3.1.2
- 1-4.3.3
- 1-4.3.3.1 (Modified paragraph: delete last sentence)
- 1-4.3.4
- 1-4.4 to 1-4.4.6 (Modify 1-4.4.2: When using digital instruments, disregard third sentence)

3.2 Definitions

3.2.1 Face.- The term "face" is defined as that area or side of the microphone case which is intended for the user's normal speech input.

3.2.2 Sound pressure level or SPL.- The term "SPL" defines the sound pressure level expressed in dB above a reference level of 2×10^{-4} dynes/centimeter. The reference level has a numerical value of 0dB SPL.

3.2.3 Sound source.- The term "sound source" defines the sound pressure level of close and distant sound fields that the microphone element is subjected to when the equipment is inside a plane wave tube equivalent to the anechoic chamber and when measurements are conducted using test procedures, that are stated in MIL-M-26542 (USAF).

3.2.4 Optional equipment and features.- As applied to this specification the term "optional" shall mean that such equipment or features shall be furnished by the contractor only when specifically ordered by the contract schedule.

3.2.5 Normal operating conditions.- The term "Normal operating conditions" is defined in 1-3.2.2.22 of FAA-G-2100/1.

3.2.6 Service conditions.- The term "service conditions" defines the environmental range of temperature and relative humidity which is +10 C to +50 C and 10% to 80% respectively as stated in paragraph 1-3.2.23 of FAA-G-2100/1.

3.2.7 Assembly.- The term "assembly" includes all of the components of the microphone element, amplifier, case, push-to-talk (PTT) switch, cord and plug in a complete configuration that meets performance requirements stated herein.

3.3 Construction.- Construction shall be accomplished in accordance with the following subparagraphs:

3.3.1 General.- General construction shall permit the headset/handset assembly to be normally used with either ear. The headsets to be furnished shall be Type 1 and Type 2, as required by the contract. Type 1 is an ear-muff with headband, and Type 2 is an over-the-ear, ear assembly. The illustrations of these types are shown in figures 5 and 6, respectively. The handset shall be furnished as required by the contract and as shown in figure 4. It should be noted that the contractor's equipment does not have to comply with the illustrations shown. Even though the contractor is required to provide a design for the ear-muff with headband, and over-the-ear, ear assembly; the contractor may select any variations to the physical layout illustrated on the drawings. Each headset shall consist of two modules. The upper module shall consist of the ear assembly and cord and the lower module shall consist of the cord and plug assembly and switch/assembly case. Both cords shall be wired into the switch/assembly case. These wires shall be connected to lugs for screw type terminals, pin connectors or any other type of connections so that the headset/handset can be maintained in accordance with paragraph 3.15. The "G" style handset assembly (see figure 4) shall consist of a noise-canceling microphone with a PTT switch, and amplifier, and a receiver unit all mounted in a high

impact plastic case. A retractile cord with a six wire, type PG-511 male plug (W.E. 425A or equivalent) shall be provided with headsets/handset to interface with external equipment. The "G" style handset shall be similar to the typical handset shown in Figure 4. The materials used for the headset/handset assembly shall be stable in strength and appearance and shall not irritate the user's skin by chafing or chemical reactions.

3.2.2 Weight.- The maximum weight of the modules and complete headset and handset assemblies are as follows:

a. Module and headset assemblies

- (1) Type #1 Headset 20 oz.
- (2) Type #1 Upper Module 8 oz.
- (3) Type #2 Headset 13.6 oz.
- (4) Type #2 Upper Module 1.6 oz.
- (5) All Models Lower Module 12 oz. (including a 25 foot cord)

b. Handset assembly

- (1) "G" style 21 oz. (including a 25 foot cord)

3.3.3 Headset upper module.- The upper module shall consist of a receiver ear assembly; noise canceling microphone with boom assembly; upper cord assembly; and required accessories such as ear tips, clothes clips, etc., see attached figures. If desired by the contractor, the amplifier and surge protection varistor may be located in the upper module, see paragraph 3.3.4.

3.3.3.1 Ear muff with headband (Type 1).- The ear muff cushion (Type 1) and opening shall be large enough to comfortably cover the ear. Materials used shall not, in themselves, cause perspiration beneath the ear muff. The muff shall be designed so that the ear is not uncomfortably pressed against the user's head. Headband unit shall be adjustable. A comfort pad shall be provided on the headband and shall have an adjustment of 1 inch or more. The ear muff on the headband shall also have an adjustment of 1 inch or more. Each adjustment shall have a friction type or similar locking feature to secure the headband in place, see figure 5. Tension shall be sufficient to eliminate slippage without causing uncomfortable pressure over a 3-hour period of continuous use.

3.3.3.2 Over-the-ear housing (Type 2).- The over-the-ear housing shall be so shaped as to permit the user to wear it comfortably for long periods behind either ear and be wholly supported by either ear. A mounting feature shall be supplied to permit the capsule to be attached to the eyeglass frame, if needed.

3.3.3.3 Microphone noise canceling.- The noise-canceling function of the microphone shall be an internal part of the headset and handset which provides the transmission of sound waves via a transmitter enclosed within a noise-canceling enclosure. Background noise or sound from a distant source shall cancel out, while sound waves from the headset user's mouth shall be transmitted. The noise canceling microphone for the headset and

handset shall meet the performance requirements defined in Paragraph 3.4 and its subparagraphs and paragraph 3.5 and its subparagraphs. The noise-canceling microphone shall be attached to an adjustable boom that permits proper microphone placement for all conditions of ear-to-mouth facial contours. The microphone and boom shall be replaceable but fasten tightly to the headset and shall be removeable only by the use of general purpose hand tools. The handset assembly shall meet the requirements of paragraph 3.4 and 3.5 and their subparagraphs.

3.3.3.4 Receiver ear assembly.- The types of receiver ear assemblies which are required are the ear muff with headband (Type 1) and the over-the-ear housing (Type 2), as specified in the contract. These types, which provide transmissions of sound waves from the transducer to the user's ear, shall meet the requirements of paragraph 3.6 and its subparagraph. In all cases surge protection varistors shall be provided by the contractor to meet the requirement of paragraph 3.6.4. Handset assembly shall also meet the requirements of paragraph 3.6 and its subparagraph.

3.3.3.4.1 Receiver eartip.- The receiver eartip shall be of soft, resilient plastic material and shall be supplied in six sizes with each over the ear assembly, as shown in figures 1 and 6 of this specification including a pouch or box. The eartip shall be constructed of material which will withstand normal manual cleaning with soap and water. Means shall be provided to connect the eartip to the receiver ear assembly in a manner that permits easy replacement.

3.3.3.5 Upper cord assembly.- The upper cord shall use plastic insulated conductors with a plastic jacket with an overall diameter not to exceed 0.155 inch. Flexibility shall permit conformance to a 3/8 inch mandrel with an 8 oz. weight attached to the loose end of a six inch section. In order to enable suitable flex and strain relief, the cord shall be provided with suitable grommets located at entry to housing (or ear muff) and to the entry of the switch box unit. The overall length of the cord shall be 46 plus 6 inches minus zero.

3.3.3.5.1 Lapel clip.- A movable clip shall be affixed to the upper cord. When externally attached, i.e., to the user's clothing, positioning of the cable shall be adjustable to relieve the weight of the lower assembly from the earpiece. A lapel clip shall be supplied with each headset.

3.3.4 Headset lower module.- The lower module shall as a minimum, consist of a switch/assembly case containing momentary and locking push-to-talk switch functions with "press-pull lock" to lock button; lower cable assembly; detachable wrist loop and belt clip. If desired by the contractor, the amplifier and varistor may be located in the lower module.

3.3.4.1 Switch/assembly case.- The switch/assembly case shall be fabricated of a high impact plastic with all corners rounded and all exterior surfaces polished. No flashing or burrs shall be permitted. It shall be assembled to permit easy interchanging of locking or nonlocking PTT buttons.

3.3.4.1.1 Case size.- The case shall be 4 $\pm \frac{1}{2}$ inches long by 2 $\pm \frac{1}{2}$ inches wide by 1 $\pm \frac{1}{2}$ inch thick, suitable shaped so that it fits comfortably in the hand of the user. The cables shall enter through separate access holes, at opposite ends of the case.

3.3.4.2 Handset case.- The handset shall be fabricated of a high impact plastic with all corners rounded and all exterior surfaces polished. No flashing or burrs shall be permitted. The handset case shall be suitably shaped and be equivalent to "G" style telephone type handset. The retractile cord shall enter the handset case at the bottom of the unit similar to a telephone unit.

3.3.4.3 Pushbutton.- The push-to-talk button shall be furnished with non-locking and locking positions. Depression of the pushbutton to either position shall be used to close a pair of contacts which activates control relays external to the headset and amplifier. In locking position, the pushbutton with a "press-to-talk" action of the thumb shall have locking capability when the depressed pushbutton is pulled to the locking position. The pushbutton shall be capable of 200,000 depressions with free release without failure. The headset push button shall be designed so that the locking feature can be inhibited. The handset shall have a non-locking pushbutton.

3.3.4.3.1 Switch.- A switch with self-wiping contacts shall be furnished. The contacts shall be rated for $\frac{1}{2}$ ampere, 48V DC.

3.3.4.4 Wrist loop.- A wrist loop and means of attaching/detaching same to the switch/assembly case shall be supplied, see figures 5 and 6.

3.3.4.4.1 Belt clip.- A clip shall be provided on the switch assembly case to transfer the weight of the case and the retractile cord to the user's belt. The clip shall be a hook-on type designed for simplicity of application and removal from the user's belt. The clip shall be mounted on the switch assembly case, see figures 5 and 6.

3.3.4.5 Lower cable assembly.- The contractor shall provide a cable assembly as specified; the line cable shall be a retractile cord six-wire connection to a PJ-511 plug (W.E. 425A or equivalent). The plug shall be non-polarized. The extended length of this cable shall be 5, 10, 15, or 25 feet as required by the contract. The retractile ratio shall be 5 to 1 or better. This cable shall withstand not less than 100,000 flexes to 45° in each direction on a $\frac{1}{4}$ inch diameter mandrel with a suspended one pound weight. The outer covering shall be plastic and resistant to cutting or scuffing. Strain relief shall be supplied at each end similar to that used with telephone handset cords.

3.3.5 Color of headset and handset.- The color of the complete headsets and handset including the plugs shall be NAS Brown, Federal Standard 595, Color No. 30372.

3.4 Microphone/amplifier performance (close sound source).- The performance requirements for the microphone/amplifier type shall be met over the range of normal operating conditions using a close sound source in accordance with paragraph 4.5. The output shall be measured at the connector tips of the twin plug.

3.4.1 Amplifier load impedance and current.- The headset and handset shall be capable of working into an effective load impedance (resistive) of 50 \pm 20 ohms at 1000 Hz with an amplifier DC input current of 50 to 100 ma.

These requirements shall be met with an external supply source of voltage applied to the connector tips of the twin plug (Fig. 2), which ranges between 10 and 100 volts.

3.4.2 Sensitivity.- An input level signal of 1000 Hz at 94 dB SPL shall produce an output level of -11 dBm + 4 dB into 50 ohms. In addition the following sensitivity requirements shall be met:

a. The output level obtained at an input level of 110 dB SPL shall be no more than 18 dB above the output level obtained with an input level of 94 dB SPL.

b. At every point in the range 94 to 110 dB SPL, a 1.0 dB increase in the sound pressure level shall produce no more than 1.3 dB increase in the output level.

c. The output level obtained with an input level of 75 dB SPL shall be 17 dB or more below the output level obtained with an input level of 94 dB SPL.

d. At every point in the range 75 to 94 dB SPL, a 1.0 dB decrease in the sound pressure level input shall produce an 0.8 dB decrease or more in the output level.

3.4.3 Noise.- With an input noise field of less than 40 dB SPL, the output noise level of the amplifier shall not exceed -55 dBm.

3.3.4 Frequency response.- With a constant signal of 94 dB SPL over the range 500 - 2500 Hz applied normal to the microphone face, the output level of the amplifier shall not vary more than + 6 dB from the 1 KHz point of the output response curve over the frequency range of 500 Hz to 1499 Hz and + 10 dB from the 1000 Hz point of the output response curve over the frequency range of 1500 Hz to 2500 Hz.

3.4.5 Harmonic distortion.- When an input signal over the range of 500 to 2500 Hz at 94 dB SPL is applied to the microphone face, the total output harmonic distortion of the amplifier shall not be greater than 5 percent.

3.4.6 Polarity.- The amplifier and the plug termination shall be non-polarized.

3.5 Microphone/amplifier performance (distant sound source).- When applying a sound source, the performance requirements for the noise canceling microphone/amplifier shall be met over the range of normal operating conditions. The source field shall be calibrated in accordance with paragraph 4.5.1. Average output reading is obtained by orienting the microphone 0°, 90°, 180°, and 270° with respect to the position facing the artificial voice and taking the average of the four readings. Turn-on and turn-off times may be required for noise-canceling microphones.

3.5.1 Sensitivity (noise immunity characteristic).- An input signal of 1000 Hz at 94 dB SPL at the microphone shall produce an average output level at least 8 dB below the level obtained with the close sound measurement (see paragraph 3.4.2).

3.5.2 Frequency response.- For a constant input signal level of 94 dB SPL over the frequency range of 500 Hz to 2500 Hz applied normal to the microphone face, the average output level shall be at least 9 dB below that level obtained with the close sound measurements (see paragraph 3.4.4).

3.5.3 Spurious output.- During normal operation of the microphone and amplifier assembly, there shall be no spurious switching transients, oscillations or "thumps" at the transmitter output terminals.

3.5.4 Turn-on time.- When a 1 KHz input signal at the microphone is raised from an input level of 70 dB SPL to 94 dB SPL, the time required to reach 71 percent of the steady-state output with a 94 dB SPL input shall be 12 milliseconds \pm 3 milliseconds.

3.5.5 Turn-off time.- When a 1 KHz input signal at the microphone is lowered from an input level of 94 dB SPL to 70 dB SPL, the time required to reach 71 percent of the change in output with a 70 dB SPL input shall be 200 milliseconds \pm 50 milliseconds.

3.6 Receiver performance.- The performance requirements for the receiver shall be met over the range of normal operating conditions and with the receiver No. 6 eartip terminated in an ASA Type 3 coupler for the Type 2 headset, or coupled to a ASA Type 1 6c.c coupler for the Type 1 headset.

3.6.1 Input impedance.- The receiver input impedance at 1000 Hz shall be 600 ohms \pm 20% resistive.

3.6.2 Sensitivity.- An input signal of -20 dBm at 1000 Hz matched to 600 ohms shall produce an output level not less than 95 dB SPL.

3.6.3 Frequency response.- With a constant power source of -20 dBm applied to the receiver input, the output level of the receiver with respect to the value measured at 1000 Hz shall be within \pm 6 dB over the frequency range of 500 Hz to 2500 Hz.

3.6.4 Surge protection.- Varistor devices across the receiver terminals shall limit the audio voltage to the receiver such that no sound pressure levels greater than 125 dB SPL appear to the ear assembly. The headset and handset assemblies shall withstand application of a voltage to the line termination which rises to 1000V in 10 microseconds and decays to half-voltage in 1500 microseconds.

3.6.5 Harmonic distortion.- When a signal of -20 dBm in the frequency range of 500 Hz to 2500 Hz is applied to the receiver input, the total harmonic distortion shall not be greater than 5 percent.

3.7 Wiring.- Wiring shall conform to the circuit diagram of Figure 2, the six-wire circuit. Wiring shall be accomplished in a workmanlike manner. No flux than rosin shall be used and no flux residue shall remain when completed.

3.7.1 Microphone connection.- The equipment provided shall be such that the microphone is always connected to the amplifier such that only energizing the external circuit is required to enable audio transmissions.

3.8 Insulation.- Insulating materials shall provide not less than 1.0 megohm resistance measured at 500V DC between the microphone and receiver circuits and between these circuits and any exposed surfaces or hardware that may be contacted by the user.

3.9 Shock and vibration resistance.- The headsets and handset and the microphone/boom assembly shall be capable of withstanding, for each of 3 mutually perpendicular planes, a free drop of 4.0 feet onto a hard surface without physical damage to the case and without exceeding 5% in distortion levels as measured in paragraph 3.4.5 and 3.4.6.

3.10 Reverse sidetone (feedback).- The reverse sidetone test measures the signal developed by the combined inductive, mechanical and acoustical coupling between the transmit and receive portions of the head and handset. When testing in accordance with Figure 3, the headset and handset shall meet the following requirements; as "e" line is held at -20 dBm and swept at approximately one octave per 10 seconds from 500 to 10,000 Hz "e₁" shall exceed "e₂" by at least 20 dBm over the entire sweep range.

3.11 Headset/handset test set.- When specified in the contract schedule, a test set shall be provided for use in testing and repairing of the headset and handset. As a minimum, the test set shall be provided the functional capability of checking: a) the continuity of the PTT switch; b) the continuity of the retractile cord and plug; c) the microphone element sensitivity at 1 kHz; d) the amplifier; and e) the receiver unit. The test set shall also have a speaker talk back sidetone checking circuit. The test set is an optional item and quantities to be ordered will be specified in the contract schedule.

3.12 Technical information.- When specified in the contract schedule each type headset/handset furnished shall include the following technical data: wiring/schematic diagram; replaceable parts list with manufacturer's part numbers; and the manufacturer's name and address. An instruction booklet shall be furnished with each headset/handset test set similar to the commercial telephone headset tester booklet.

3.13 Training film/video tape.- When specified in the contract schedule, the contractor shall provide a 16mm film and a one-half inch reel-to-reel video tape on the usage and care of headset/handset with emphasis on proper operating and wearing practices for the noise-canceling feature. The film and the video tape shall be not less than 10 minutes each in duration.

3.14 Reliability requirements.- The contractor shall prepare a reliability prediction report in accordance with MIL-HDBK-217A. The report shall contain failure rate data on each part and on each circuit card used in the design. The predicted mean-time-between-failure (MTBF) shall be at least 20,000 hours for each of the transmitting and receiving assembly based on the following conditions:

1. Operating under service conditions of maximum voltage and temperature.

2. Service life of 5 years, operating 24 hours per day seven days per week.

3.15 Maintainability requirements.- The equipment design shall be such that a maximum possible equipment utilization, consistent with high reliability, will be realized through maintainability practices. Corrective and preventive maintenance shall be considered on the following basis:

1. Corrective maintenance.- In the event of a failure it shall be possible to restore the equipment to an operational condition within 10 minutes. This fault correction time is based on removing and replacing a like module or circuit card, microphone and boom, upper module, lower cord and plug or switch case.

3.16 RFI interference.- The headsets and handset shall not be susceptible to any environmental disturbance which causes or can cause undesired response, malfunction, or degradation of performance. The signal measured at the output of the headset or handset shall be no greater than -50 dBV when they are subjected to a field strength of 3 V/M at 30% modulation up to 1 GHz. The headset/handset shall be properly shielded and have the necessary filtering to prevent interference caused by coupling and/or induction.

3.17 Electronic devices.- All active electron devices and diodes used in this equipment shall be semiconductor devices and they shall be protected against surges and transients in accordance with FAA-G-2100/3.

3.18 Printed wiring techniques.- Printed wiring board shall be used in lieu of individual circuits and shall be in accordance with FAA-G-2100/5.

3.19 Microelectronic devices.- Microelectronic devices shall be used in lieu of individual circuits and shall be in accordance with FAA-G-2100/5.

3.20 Pouch, storing case.- A pouch for providing dust-free storage shall be of a sturdy material and shall include a zipper or any other method of securely enclosing the headset/handset in the storage unit without having to disassemble the headset/handset, see figures 5 and 6. Space shall be provided for ear plugs, etc., within the pouch storage case.

4.0 QUALITY ASSURANCE PROVISIONS

4.1 Quality control.- The contractor shall be responsible for conducting all inspection and testing to assure product conformance with the requirements of the contract and this specification. The contractor shall provide and maintain quality control program in accordance with FAA-STD-013, and the quality assurance provisions specified in Section 1-4 of Specification FAA-G-2100/1 shall apply.

4.2 Design qualification tests.- Under normal test conditions, tests to demonstrate compliance with the following requirements shall be made:

<u>Test</u>	<u>Paragraph Number</u>
Construction & weight	3.3 and 3.3.2
Amplifier load impedance & current	3.4.1
Input impedance (Rec.)	3.6.1
Frequency response (Mic.)	3.4.4
Polarity	3.4.6
Module & Headband	3.3.3, 3.3.3.1 and 3.3.3.2
Noise canceling	3.3.3.3
Receiver ear assembly	3.3.3.4 and 3.3.3.4.1
Upper cord assembly	3.3.3.5 and 3.3.3.5.1
Lower assembly	3.3.4, 3.3.4.1 and 3.3.3.4.1.1
Handset case	3.3.4.2
Microphone connection & wiring	3.7 and 3.7.1
Insulation	3.8
Shock and vibration resistance	3.9
Surge protection	3.6.4
Headset/handset tester	3.11
Pushbutton	3.3.4.3 and 3.3.4.3.1
RFI interference	3.16
Wrist loop and belt clip	3.3.4.4 and 3.3.4.4.1
Lower cable assembly	3.3.4.5
Color of set	3.3.5
Spurious output	3.5.3
Turn-on time	3.5.4
Turn-off time	3.5.5

4.2.1 Design qualification tests.- Under service test conditions, tests shall be made to demonstrate compliance with specification requirements listed in design qualification tests, paragraph 4.2 and type test 4.3. Both types of headsets and handset shall be subjected to the environmental tests as stated in paragraph 1-4.12 of FAA-G-2100/1 except that during this period of time the headsets and handset shall not be operative. After the complete cycle of tests, the headsets and handset shall be examined to determine specification compliance in accordance with paragraph 4.2 of this specification, type test 4.3 and paragraph 1-4.12.1 of FAA-G-2100/1.

4.3 Type test.- Under normal conditions, tests to demonstrate compliance with the following requirements shall be made:

<u>Test</u>	<u>Paragraph Number</u>
Frequency response (Mic.)	3.4.4
Harmonic distortion (Mic.)	3.4.5
Frequency response-noise canceling microphone	3.5 and 3.5.2
Frequency response (Rec.)	3.6, 3.6.2 and 3.6.3
Harmonic distortion (Rec.)	3.6.5
Noise (Mic.)	3.4.3
Reverse sidetone (Feedback)	3.10

4.4 Production tests.- Under normal test conditions, tests to demonstrate compliance with the following requirements shall be made:

<u>Test</u>	<u>Paragraph Number</u>
General (Visual and mechanical inspection)	3.3.1 thru 3.3.5
Surge protection	3.6.4
Sensitivity (close sound source)	3.4.2
Sensitivity (distant sound source) (noise canceling microphone)	3.5.1
Sensitivity (Receiver)	3.6.2
Headset/handset tester	3.11

4.5 Microphone close sound source.- During the microphone/amplifier tests, the microphone shall be located $\frac{1}{4}$ inch from the centerline axis of the artificial voice for a sound pressure level of 94 dB SPL at 1000 Hz. The artificial voice shall be calibrated with a W.E. 640 AA microphone or demonstrated equivalent.

4.5.1 Microphone distant sound source.- The noise canceling microphone under test shall be located 24 inches from the artificial voice on the centerline axis and shall have a sound pressure level of 94 dB SPL (1000 Hz) at the source. Tests shall be performed inside a plane wave tube similar to an anechoic chamber per MIL-M-26542A (USAF). The artificial voice shall be calibrated with a W.E. 640 AA microphone or demonstrated equivalent.

4.6 Design engineering qualification.- In addition to requirements of paragraph 4.2, the design engineering qualification shall be supplied in accordance with the following subparagraphs:

4.6.1 Mock-up assembly.- Mock-up headsets and handset assemblies shall be submitted to the contracting officer for approval as required by the contract schedule. This mock-up shall be in all aspects the final design proposed by the contractor to demonstrate compliance with the requirements stated in paragraph 3.3.1 through 3.3.5. This mock-up need not incorporate performance requirements such as 200,000 failure-free operations of the push button but shall incorporate all the human factors design requirements such as form, fit and functional characteristics for both types of headsets and handset. The purpose of this design mock-up submission is to permit the Government to review and approve these design requirements prior to the contractor manufacturing prototype or production equipment for delivery to the Government.

4.6.2 Engineering data.- Engineering data shall be submitted to the contracting officer, as required by the contract, to demonstrate compliance with requirements stated in the paragraphs listed below and in 3.14 and 3.15. The contractor shall demonstrate compliance by any of the following means: dynamic testing; by calculations based on design parameters, parts and material specifications; or a combination of both testing and calculations. If stated in the contract, the contractor shall perform dynamic testing to demonstrate compliance.

<u>Test</u>	<u>Paragraph Number</u>
Flexibility	3.3.3.4
200,000 depressions	3.3.4.2
100,000 flexes	3.3.4.5

4.7 Prototype qualification.- When specified in the contract schedule, design qualification tests specified herein shall be conducted with a test sample consisting of at least five (5) prototype or production assemblies that are representative of the production equipment of the headsets and the headset. Upon successful completion of these tests, there will be no further design qualification tests required for the production quantities on order. When specified in the contract schedule the Government will require a field evaluation of these assemblies for a period of 60 days as part of the design qualification tests. In the event the contractor elects to manufacture additional assemblies prior to successful completion of prototype qualification tests; he does so wholly at his own risk.

5. PREPARATION FOR DELIVERY

5.1 Preservation, packaging and packing.- The preservation, packaging, and packing for each assembly shall be in accordance with MIL-E-17555, Level C.

5.2 Individual packing.- Where two or more units are packed in a common shipping container, each unit with its accessories shall be packed and marked so that it can be identified and reshipped individually without repacking.

6. NOTES

6.1 Note on information items.- The contents of Section 6 including figures 4, 5, and 6 are only for the information of the initiator of the procurement request and are not a part of the requirements of this specification. They are not contract requirements nor binding on either the Government or the contractor. Any reliance placed by the contractor on the information in these subparagraphs is wholly at the contractor's own risk.

6.2 Options.- Inasmuch as this specification includes several optional arrangements, it will be necessary that the contract schedule specify the options to be exercised:

- | | |
|----------|-------------------------------------|
| Option 1 | Headsets (3.3.1) |
| | (a) ear-muff with headband assembly |
| | (b) over-the-ear, ear assembly |
| Option 2 | Handset (3.3.1) |
| Option 3 | Retractable cord length (3.3.4.5) |
| | (a) 5 feet extended |
| | (b) 10 feet extended |
| | (c) 15 feet extended |
| | (d) 25 feet extended |

- Option 4 Headset/handset tester (3.11)
- Option 5 Training film/video tape (3.13)
- Option 6 Mock-up assembly (4.6.1)
- Option 7 Prototype qualification (4.7)

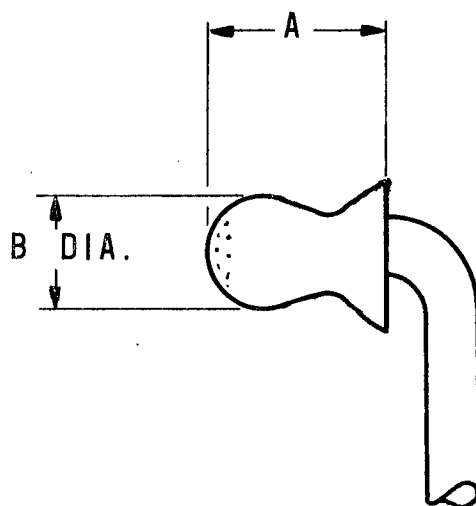
6.3 Intended use. - The headsets and handset assemblies are intended to be used as an FAA standard, at ARTCC's, TRACON's, Towers and Flight Service Stations.

* * * * *

Attachment

Figures

- 1
- 2
- 3
- 4 (Drawing No. C-6143)
- 5 (Drawing No. C-6144)
- 6 (Drawing No. C-6145)



SIZE	A	B
1	0.410	0.255
2	0.500	0.275
3	0.562	0.300
4	0.613	0.325
5	0.675	0.350
6	0.775	0.385

NOTE: DIMENSIONS IN INCHES

FIGURE 1
RECEIVER EARTIP

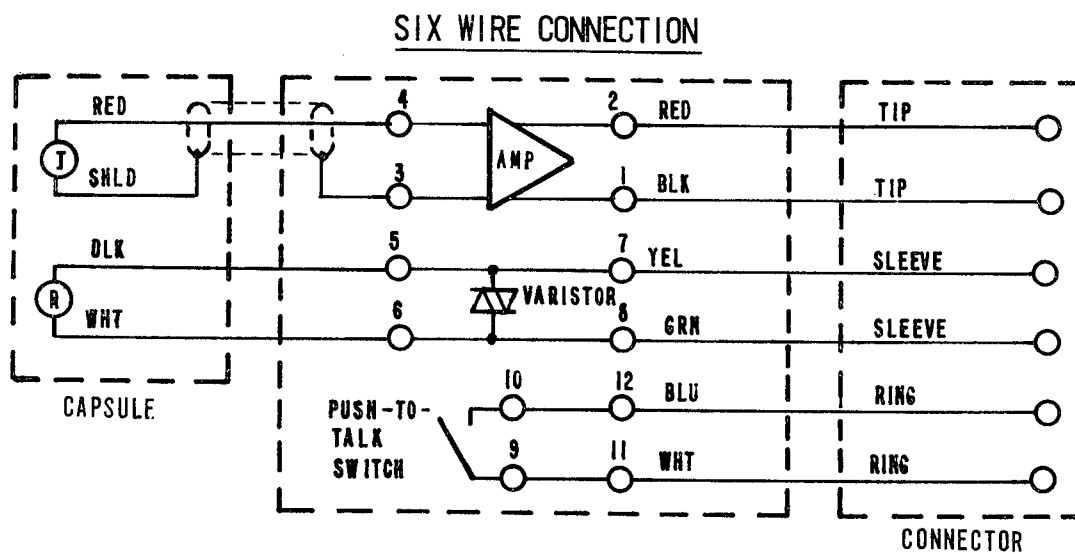


FIGURE 2
Headset Assembly and Handset Assembly
Wiring Diagram

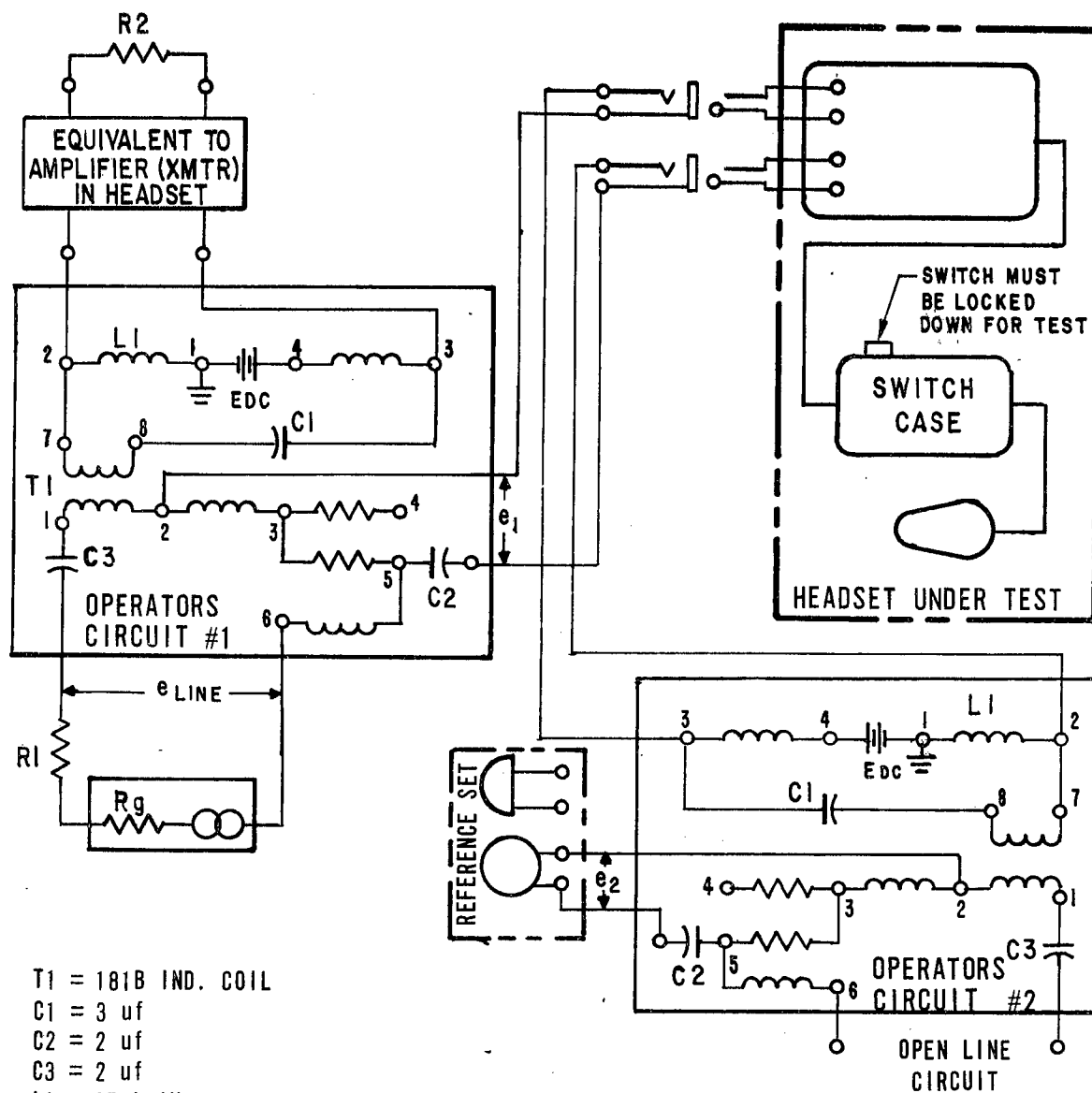
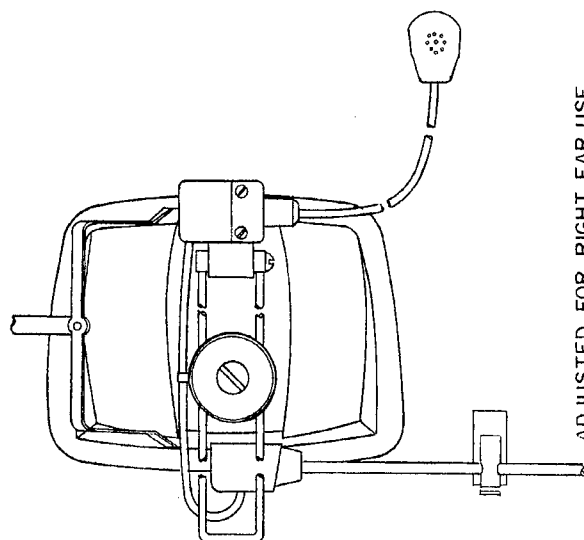
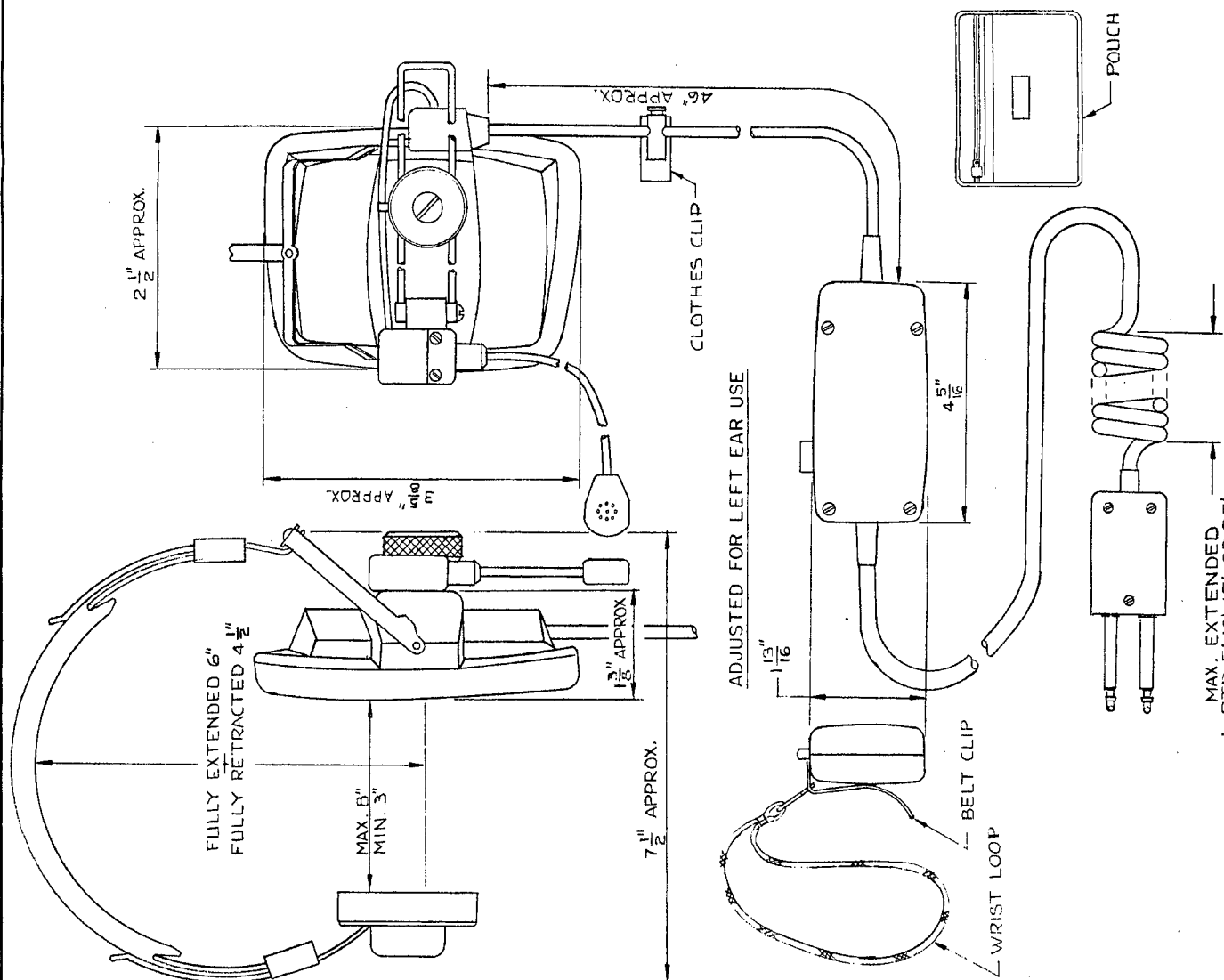
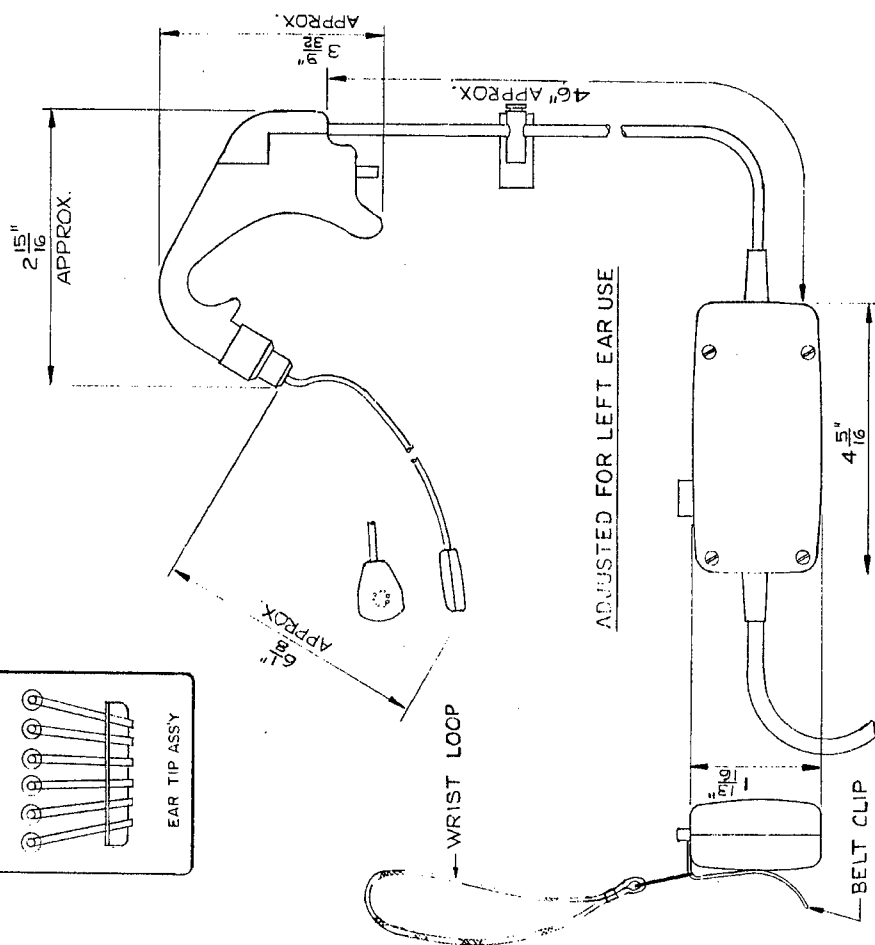


FIGURE 3
REVERSE SIDETONE TEST
(FOR 600-Ω RECEIVERS)

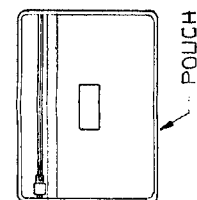
[illegible]



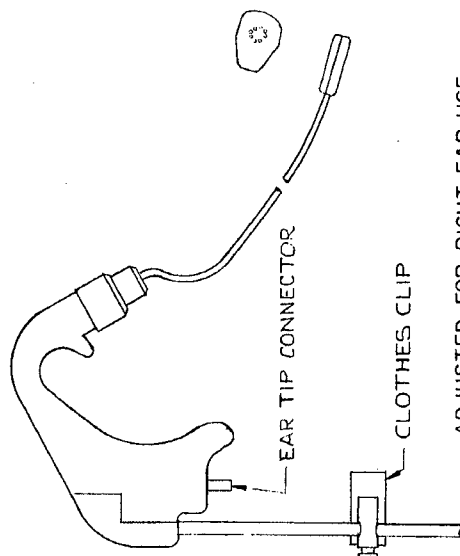
ADJUSTED FOR LEFT EAR USE

WRIST LOOP

BELT CLIP



MAX. EXTENDED —
STD. 5', 10', 15', OR 25'



ADJUSTED FOR RIGHT EAR USE


REV. LTR.	DATE	DESCRIPTION	CHECKED	APPROVED
		DEPARTMENT OF TRANSPORTATION FEDERAL AVIATION ADMINISTRATION WASHINGTON, D. C. 20591		
<p style="text-align: center;">LIGHTWEIGHT HEADSET TYPE II (TYPICAL DRAWING)</p>				
REVISED BY 461	DATE 10/1/40	SUBMITTED BY O. B. Clark S. H. TERMINAL COMMUNICATIONS Bldg. 2nd Fl. 450 CH. NAVARRE/CONNA ENCL. BIV. 10/1/40	APPROVED BY 	
DESIGNED BY R. A.	DATE 10/1/40	DRAWN BY R. A.	DATE - SEPT. 20, 1977 C-6145 DRAWING NO.	
CHECKED BY R. A.	DATE 10/1/40	AIRWAY FACILITIES SERVICE	REV. LTR.	

FIGURE-6

